

SEQUENCE LISTING

(1) GENERAL INFORMATION:

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(i) APPLICANT: Griffith, Irwin J.  
Kuo, Mei-Chang  
Luqman, Mohammad

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(ii) TITLE OF INVENTION: T CELL EPITOPES OF RYEGRASS POLLEN  
ALLERGEN

(iii) NUMBER OF SEQUENCES: 58

15

(iv) CORRESPONDENCE ADDRESS:

(A) ADDRESSEE: LAHIVE & COCKFIELD  
(B) STREET: 60 State Street, suite 510  
(C) CITY: Boston  
(D) STATE: Massachusetts  
(E) COUNTRY: USA  
(F) ZIP: 02109

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(v) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: Floppy disk  
(B) COMPUTER: IBM PC compatible  
(C) OPERATING SYSTEM: PC-DOS/MS-DOS  
(D) SOFTWARE: ASCII Text

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(vi) CURRENT APPLICATION DATA:

(A) APPLICATION NUMBER: US 08/106,016  
(B) FILING DATE: 31-AUG-1993  
(C) CLASSIFICATION:

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(viii) ATTORNEY/AGENT INFORMATION:

(A) NAME: Amy E. Mandragouras  
(B) REGISTRATION NUMBER: 36,207  
(C) REFERENCE/DOCKET NUMBER: 075 (IMI-040cp2PC)

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(ix) TELECOMMUNICATION INFORMATION:

(A) TELEPHONE: (617) 227-7400  
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(2) INFORMATION FOR SEQ ID NO:1:

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(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 1229 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

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(ii) MOLECULE TYPE: cDNA

0873904-11096

(ix) FEATURE:

5 (A) NAME/KEY: CDS  
(B) LOCATION: 40..942

(ix) FEATURE:

10 (A) NAME/KEY: mat\_peptide  
(B) LOCATION: 115..940

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

15 CGCTATCCCT CCCTCGTACA AACAAACGCA AGAGCAGCA ATG GCC GTC CAG AAG 54  
Met Ala Val Gln Lys  
-25

20 TAC ACG GTG GCT CTA TTC CTC GCC GTG GCC CTC GTG GCG GGC CCG GCC 102  
Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Leu Val Ala Gly Pro Ala  
-20 -15 -10 -5

25 GCC TCC TAC GCC GCT GAC GCC GGC TAC ACC CCC GCA GCC GCG GCC ACC 150  
Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Thr Pro Ala Ala Ala Ala Thr  
1 5 10

30 CCG GCT ACT CCT GCT GCC ACC CCG GCT GCG GCT GGA GGG AAG GCG ACG 198  
Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Ala Gly Gly Lys Ala Thr  
15 20 25

ACC GAC GAG CAG AAG CTG CTG GAG GAC GTC AAC GCT GGC TTC AAG GCA 246  
Thr Asp Glu Gln Lys Leu Leu Glu Asp Val Asn Ala Gly Phe Lys Ala  
30 35 40

35 GCC GTG GCC GCC GCT GCC AAC GCC CCT CCG GCG GAC AAG TTC AAG ATC 294  
Ala Val Ala Ala Ala Ala Asn Ala Pro Pro Ala Asp Lys Phe Lys Ile  
45 50 55 60

40 TTC GAG GCC GCC TTC TCC GAG TCC TCC AAG GGC CTC CTC GCC ACC TCC 342  
Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly Leu Leu Ala Thr Ser  
65 70 75

45 GCC GCC AAG GCA CCC GGC CTC ATC CCC AAG CTC GAC ACC GCC TAC GAC 390  
Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys Leu Asp Thr Ala Tyr Asp  
80 85 90

GTC GCC TAC AAG GCC GCC GAG GGC GCC ACC CCC GAG GCC AAG TAC GAC 438  
Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro Glu Ala Lys Tyr Asp  
95 100 105

08737904-112095

9602277-4062E280

	GCC TTC GTC ACT GCC CTC ACC GAA GCG CTC CGC GTC ATC GCC GGC GCC	486
	Ala Phe Val Thr Ala Leu Thr Glu Ala Leu Arg Val Ile Ala Gly Ala	
	110 115 120	
5	CTC GAG GTC CAC GCC GTC AAG CCC GCC ACC GAG GAG GTC CCT GCT GCT	534
	Leu Glu Val His Ala Val Lys Pro Ala Thr Glu Glu Val Pro Ala Ala	
	125 130 135 140	
10	AAG ATC CCC ACC GGT GAG CTG CAG ATC GTT GAC AAG ATC GAT GCT GCC	582
	Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp Lys Ile Asp Ala Ala	
	145 150 155	
15	TTC AAG ATC GCA GCC ACC GCC GCC AAC GCC GCC CCC ACC AAC GAT AAG	630
	Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys	
	160 165 170	
20	TTC ACC GTC TTC GAG AGT GCC TTC AAC AAG GCC CTC AAT GAG TGC ACG	678
	Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala Leu Asn Glu Cys Thr	
	175 180 185	
25	GGC GGC GCC TAT GAG ACC TAC AAG TTC ATC CCC TCC CTC GAG GCC GCG	726
	Gly Gly Ala Tyr Glu Thr Tyr Lys Phe Ile Pro Ser Leu Glu Ala Ala	
	190 195 200	
30	GTC AAG CAG GCC TAC GCC GCC ACC GTC GCC GCC GCG CCC GAG GTC AAG	774
	Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala Pro Glu Val Lys	
	205 210 215 220	
35	TAC GCC GTC TTT GAG GCC GCG CTG ACC AAG GCC ATC ACC GCC ATG ACC	822
	Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met Thr	
	225 230 235	
40	CAG GCA CAG AAG GCC GGC AAA CCC GCT GCC GCC GCT GCC ACA GGC GCC	870
	Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala Ala Ala Ala Thr Gly Ala	
	240 245 250	
45	GCA ACC GTT GCC ACC GGC GCC GCA ACC GCC GCC GCC GGT GCT GCC ACC	918
	Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala Ala Gly Ala Ala Thr	
	255 260 265	
50	GCC GCT GCT GGT GGC TAC AAA GCC TGATCAGCTT GCTAATATAC TACTGAACGT	972
	Ala Ala Ala Gly Gly Tyr Lys Ala	
	270 275	
55	ATGTATGTGC ATGATCCGGG CGGCGAGTGG TTTTGTGAT AATTAATCTT CGTTTTTCGTT	1032
	TCATGCAGCC GCGATCGAGA GGGCTTGCAAT GCTTGTAATA ATTCAATATT TTTCATTTCT	1092
60	TTTTGAATCT GTAAATCCCC ATGACAAGTA GTGGGATCAA GTCGGCATGT ATCACCGTTG	1152
	ATGCGAGTTT AACGATGGGG AGTTTATCAA AGAATTTATT ATTAAAAAAA AAAAAAAAAA	1212

AAAAAAAAA AAAAAAA

1229

5 (2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 301 amino acids

(B) TYPE: amino acid

10 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

15 Met Ala Val Gln Lys Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Leu  
-25 -20 -15 -10  
20 Val Ala Gly Pro Ala Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Thr Pro  
-5 1 5  
Ala Ala Ala Ala Thr Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Ala  
10 15 20  
25 Gly Gly Lys Ala Thr Thr Asp Glu Gln Lys Leu Leu Glu Asp Val Asn  
25 30 35  
Ala Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Asn Ala Pro Pro Ala  
40 45 50 55  
30 Asp Lys Phe Lys Ile Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly  
60 65 70  
Leu Leu Ala Thr Ser Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys Leu  
35 75 80 85  
Asp Thr Ala Tyr Asp Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro  
90 95 100  
40 Glu Ala Lys Tyr Asp Ala Phe Val Thr Ala Leu Thr Glu Ala Leu Arg  
105 110 115  
Val Ile Ala Gly Ala Leu Glu Val His Ala Val Lys Pro Ala Thr Glu  
120 125 130 135  
45 Glu Val Pro Ala Ala Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp  
140 145 150  
Lys Ile Asp Ala Ala Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala Ala  
50 155 160 165  
Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala

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-51-



170

175

180

91

08737904-112096

5 Ser Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala  
200 205 210 215

10

15

Ala Gly Ala Ala Thr	Ala Ala Ala Gly Gly Tyr Lys Ala
265	270 275

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(v) FRAGMENT TYPE: internal

35 Ala Asp Ala Gly Tyr Thr Pro Ala Ala Ala Ala Thr Pro Ala Thr Pro  
1 5 10 15

40

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

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(v) FRAGMENT TYPE: internal

Ala Thr Thr Asp  
20

10 (2) INFORMATION FOR SEQ ID NO:5:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 20 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

Ala Ala Ala Gly Gly Lys Ala Thr Thr Asp Glu Gln Lys Leu Leu Glu  
1 5 10 15

Asp Val Asn Ala  
20

(2) INFORMATION FOR SEQ ID NO:6:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 20 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

Glu Gln Lys Leu Leu Glu Asp Val Asn Ala Gly Phe Lys Ala Ala Val  
1 5 10 15

Ala Ala Ala Ala  
20

(2) INFORMATION FOR SEQ ID NO:7:

5 (i) SEQUENCE CHARACTERISTICS:  
 (A) LENGTH: 20 amino acids  
 (B) TYPE: amino acid  
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

10 (v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

15 Gly Phe Lys Ala Ala Val Ala Ala Ala Asn Ala Pro Pro Ala Asp  
 1 5 10 15

20 Lys Phe Lys Ile  
 20

(2) INFORMATION FOR SEQ ID NO:8:

25 (i) SEQUENCE CHARACTERISTICS:  
 (A) LENGTH: 20 amino acids  
 (B) TYPE: amino acid  
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

30 (v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

35 Asn Ala Pro Pro Ala Asp Lys Phe Lys Ile Phe Glu Ala Ala Phe Ser  
 1 5 10 15

40 Glu Ser Ser Lys  
 20

(2) INFORMATION FOR SEQ ID NO:9:

45 (i) SEQUENCE CHARACTERISTICS:  
 (A) LENGTH: 20 amino acids  
 (B) TYPE: amino acid  
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

50 (v) FRAGMENT TYPE: internal

360211-4054480

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(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

5 Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly Leu Leu Ala Thr Ser  
1 5 10 15

Ala Ala Lys Ala  
20

10 (2) INFORMATION FOR SEQ ID NO:10:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 20 amino acids

15 (B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

20 (v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

25 Gly Leu Leu Ala Thr Ser Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys  
1 5 10 15

30 Leu Asp Thr Ala  
20

(2) INFORMATION FOR SEQ ID NO:11:

(i) SEQUENCE CHARACTERISTICS:

35 (A) LENGTH: 20 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

40 (ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

45 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

50 Pro Gly Leu Ile Pro Lys Leu Asp Thr Ala Tyr Asp Val Ala Tyr Lys  
1 5 10 15

Ala Ala Glu Gly  
20

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(v) FRAGMENT TYPE: internal

5 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

Val Thr Ala Leu Thr Glu Ala Leu Arg Val Ile Ala Gly Ala Leu Glu  
1 5 10 15

10 Val His Ala Val  
20

(2) INFORMATION FOR SEQ ID NO:15:

15 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

20 (ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

25 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

Ile Ala Gly Ala Leu Glu Val His Ala Val Lys Pro Ala Thr Glu Glu  
1 5 10 15

30 Val Pro Ala Ala  
20

(2) INFORMATION FOR SEQ ID NO:16:

35 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

40 (ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

45 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

Lys Pro Ala Thr Glu Glu Val Pro Ala Ala Lys Ile Pro Thr Gly Glu  
1 5 10 15

Leu Gln Ile Val

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(2) INFORMATION FOR SEQ ID NO:17:

10 (ii) MOLECULE TYPE: peptide  
(v) FRAGMENT TYPE: internal

15 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

20 Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp Lys Ile Asp Ala Ala  
1 5 10 15  
Phe Lys Ile Ala  
20

(2) INFORMATION FOR SEQ ID NO:18:

51 (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide  
(v) FRAGMENT TYPE: internal

35

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

40      Asp Lys Ile Asp Ala Ala Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala  
          1                         5                         10                         15

Ala Pro Thr Asn  
                20

45 (2) INFORMATION FOR SEQ ID NO:19:

(i) SEQUENCE CHARACTERISTICS:  
 (A) LENGTH: 20 amino acids  
 (B) TYPE: amino acid  
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

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(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

Ala Thr Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe  
1 5 10 15

10

Glu Ser Ala Phe  
20

(2) INFORMATION FOR SEQ ID NO:20:

15

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

20

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

25

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:20:

Asp Lys Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala Leu Asn Glu  
1 5 10 15

30

Cys Thr Gly Gly  
20

(2) INFORMATION FOR SEQ ID NO:21:

35

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

40

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

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(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

Asn Lys Ala Leu Asn Glu Cys Thr Gly Gly Ala Tyr Glu Thr Tyr Lys  
1 5 10 15

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Phe Ile Pro Ser  
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(2) INFORMATION FOR SEQ ID NO:22:

10

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

15

- (ii) MOLECULE TYPE: peptide  
(v) FRAGMENT TYPE: internal

20

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:22:

Ala Tyr Glu Thr Tyr Lys Phe Ile Pro Ser Leu Glu Ala Ala Val Lys  
1 5 10 15

25

Gln Ala Tyr Ala  
20

(2) INFORMATION FOR SEQ ID NO:23:

30

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

35

- (ii) MOLECULE TYPE: peptide  
(v) FRAGMENT TYPE: internal

40

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23:

45

Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala  
1 5 10 15

Pro Glu Val Lys  
20

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(2) INFORMATION FOR SEQ ID NO:24:

- (i) SEQUENCE CHARACTERISTICS:

960227-1064280

(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

5 (ii) MOLECULE TYPE: peptide  
(v) FRAGMENT TYPE: internal

10 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

Ala Thr Val Ala Ala Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Ala  
1 5 10 15

Ala Leu Thr Lys  
20

(2) INFORMATION FOR SEQ ID NO:25:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide  
(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:

Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met Thr  
1 5 10 15

Gln Ala Gln Lys  
20

(2) INFORMATION FOR SEQ ID NO:26:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide  
(v) FRAGMENT TYPE: internal

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(xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:

Ala Ile Thr Ala Met Thr Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala  
1 5 10 15  
Ala Ala Ala Thr  
20

(2) INFORMATION FOR SEQ ID NO:27:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:27:

Ala Gly Lys Pro Ala Ala Ala Ala Ala Thr Gly Ala Ala Thr Val Ala  
1 5 10 15  
Thr Gly Ala Ala  
20

(2) INFORMATION FOR SEQ ID NO:28:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:28:

Gly Ala Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala Ala Gly Ala  
1 5 10 15  
Ala Thr Ala Ala  
20

(2) INFORMATION FOR SEQ ID NO:29:

039044-1064E80

51

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 16 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:29:

Thr Ala Ala Ala Gly Ala Ala Thr Ala Ala Ala Gly Gly Tyr Lys Ala  
1 5 10 15

(2) INFORMATION FOR SEQ ID NO:30:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:30:

Ile Ala Lys Val Pro Pro Gly Pro Asn Ile Thr Ala Glu Tyr Gly Asp  
1 5 10 15

Lys Trp Leu Asp  
20

(2) INFORMATION FOR SEQ ID NO:31:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

Ile	Ala	Lys
Val	Xaa	Pro
Gly	Xaa	Asn
Ile	Thr	Ala
Glu	Tyr	Gly
Asp		
1	5	10
		15
Lys	Trp	Leu
Asp		
20		

(i) **SEQUENCE CHARACTERISTICS:**  
 (A) **LENGTH:** 20 amino acids  
 (B) **TYPE:** amino acid  
 (D) **TOPOLOGY:** linear

(v) FRAGMENT TYPE: internal

Thr Ala Glu Tyr Gly Asp Lys Trp Leu Asp Ala Lys Ser Thr Trp Tyr  
1 5 10 15  
Gly Lys Pro Thr  
20

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(v) FRAGMENT TYPE: internal

Gly	Ala	Gly	Pro	Lys	Asp	Asn	Gly	Gly	Ala	Cys	Gly	Tyr	Lys	Asn	Val
1				5					10					15	
Asp Lys Ala Pro 20															

(2) INFORMATION FOR SEQ ID NO:34:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

5

(ii) MOLECULE TYPE: peptide

10

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:34:

15

Gly Ala Gly Pro Lys Asp Asn Gly Gly Ala Cys Gly Tyr Lys Asp Val  
1 5 10 15

Asp Lys Ala Pro  
20

20

(2) INFORMATION FOR SEQ ID NO:35:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

25

(ii) MOLECULE TYPE: peptide

30

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:35:

35

Cys Gly Tyr Lys Asp Val Asp Lys Ala Pro Phe Asn Gly Met Thr Gly  
1 5 10 15

Cys Gly Asn Thr  
20

40

(2) INFORMATION FOR SEQ ID NO:36:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

45

(ii) MOLECULE TYPE: peptide

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(v) FRAGMENT TYPE: internal

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Phe Asn Gly Met Thr Gly Cys Gly Asn Thr Pro Ile Phe Lys Asp Gly  
1 5 10 15  
Arg Gly Cys Gly  
20

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(v) FRAGMENT TYPE: internal

Pro Ile Phe Lys Asp Gly Arg Gly Cys Gly Ser Cys Phe Glu Ile Lys  
1 5 10 15  
Cys Thr Lys Pro  
20

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(v) FRAGMENT TYPE: internal

[illegible]

(2) INFORMATION FOR SEQ ID NO:39:

(i) SEQUENCE CHARACTERISTICS:  
 (A) LENGTH: 20 amino acids  
 (B) TYPE: amino acid  
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:39:

Glu Ser Cys Ser Gly Glu Ala Val Thr Val Thr Ile Thr Asp Asp Asn  
 1 5 10 15  
 Glu Glu Pro Ile  
 20

(2) INFORMATION FOR SEQ ID NO:40:

(i) SEQUENCE CHARACTERISTICS:  
 (A) LENGTH: 20 amino acids  
 (B) TYPE: amino acid  
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:40:

Thr Ile Thr Asp Asp Asn Glu Glu Pro Ile Ala Pro Tyr His Phe Asp  
 1 5 10 15  
 Leu Ser Gly His  
 20

(2) INFORMATION FOR SEQ ID NO:41:

(i) SEQUENCE CHARACTERISTICS:  
 (A) LENGTH: 20 amino acids  
 (B) TYPE: amino acid  
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

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15  
08737904-112095  
SECRET



Val Lys Cys Lys  
20

(2) INFORMATION FOR SEQ ID NO:44:

5 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

10 (ii) MOLECULE TYPE: peptide  
(v) FRAGMENT TYPE: internal

15 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:44:

51  
20 Glu Leu Gln Phe Arg Arg Val Lys Cys Lys Tyr Pro Asp Asp Thr Lys  
1 5 10 15  
Pro Thr Phe His  
20

(2) INFORMATION FOR SEQ ID NO:45:

25 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

30 (ii) MOLECULE TYPE: peptide  
(v) FRAGMENT TYPE: internal

35 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:45:

40 Tyr Pro Asp Asp Thr Lys Pro Thr Phe His Val Glu Lys Ala Ser Asn  
1 5 10 15  
Pro Asn Tyr Leu  
20

(2) INFORMATION FOR SEQ ID NO:46:

45 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

50 (ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

5 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:46:

Val Glu Lys Ala Ser Asn Pro Asn Tyr Leu Ala Ile Leu Val Lys Tyr  
1 5 10 15

10 Val Asp Gly Asp  
20

(2) INFORMATION FOR SEQ ID NO:47:

15 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

20 (ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

25 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:47:

91 Val Glu Lys Gly Ser Asn Pro Asn Tyr Leu Ala Ile Leu Val Lys Tyr  
1 5 10 15

30 Val Asp Gly Asp  
20

(2) INFORMATION FOR SEQ ID NO:48:

35 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

40 (ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

45 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:48:

50 Ala Ile Leu Val Lys Tyr Val Asp Gly Asp Gly Asp Val Val Ala Val  
1 5 10 15

Asp Ile Lys Glu

080322T 110627E 180

20

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(2) INFORMATION FOR SEQ ID NO:49:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:49:

Gly Asp Val Val Ala Val Asp Ile Lys Glu Lys Gly Lys Asp Lys Trp  
 1 5 10 15  
 Ile Glu Leu Lys  
 20

(2) INFORMATION FOR SEQ ID NO:50:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:50:

Lys Gly Lys Asp Lys Trp Ile Glu Leu Lys Glu Ser Trp Gly Ala Val  
 1 5 10 15  
 Trp Arg Ile Asp  
 20

(2) INFORMATION FOR SEQ ID NO:51:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

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61

(v) FRAGMENT TYPE: internal

5 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:51:

Thr Pro Asp Lys Leu Thr Gly Pro Phe Thr Val Arg Tyr Thr Thr Glu  
1 5 10 15

10 Gly Gly Thr Lys  
20

(2) INFORMATION FOR SEQ ID NO:52:

15 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

20 (ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

25 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:52:

Val Arg Tyr Thr Thr Glu Gly Gly Thr Lys Ser Glu Val Glu Asp Val  
1 5 10 15

30 Ile Pro Glu Gly  
20

(2) INFORMATION FOR SEQ ID NO:53:

35 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

40 (ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

45 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:53:

50 Ser Glu Val Glu Asp Val Ile Pro Glu Gly Trp Lys Ala Asp Thr Ser  
1 5 10 15

Tyr Ser Ala Lys

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20

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91

(2) INFORMATION FOR SEQ ID NO:54:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 33 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: N-terminal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:54:

Ala Asp Ala Gly Tyr Thr Hyp Ala Ala Ala Ala Thr Hyp Ala Thr Hyp  
 1 5 10 15  
 Ala Ala Thr Hyp Ala Ala Ala Gly Gly Lys Ala Thr Thr Asp Glu Gln  
 20 25 30  
 Lys

(2) INFORMATION FOR SEQ ID NO:55:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:55:

Ala Lys Ser Thr Trp Tyr Gly Lys Pro Thr Gly Ala Gly Pro Lys Asp  
 1 5 10 15  
 Asn Gly Gly Ala  
 20

(2) INFORMATION FOR SEQ ID NO:56:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

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(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: internal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:56:

10 Glu Ser Trp Gly Ala Val Trp Arg Ile Asp Thr Pro Asp Lys Leu Thr  
1 5 10 15  
15 Gly Pro Phe Thr  
20

(2) INFORMATION FOR SEQ ID NO:57:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1181 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 53..124

(ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 125..961

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:57:

GAATTCGAGG ATCCGGGTAC CATGGCTCCG ACAAACCAAC GCAAGAGCAG CA ATG 55  
Met  
40 GCA GTG CAG CAG TAC ACG GTG GCG CTG TTC CTG GCC GTG GCC TCG TGT 103  
Ala Val Gln Gln Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Ser Cys  
-20 -15 -10  
45 CGG GCC CGC GCC TCC TAC GCC GCC GAC GCC GGC TAC GCC CCC GCC ACT 151  
Arg Ala Arg Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Ala Pro Ala Thr  
-5 1 5  
50 CCC GCC ACC CCG GCT ACC CCC GCG GCC CCA GGC GCA GCG GTG CCA GCA 199  
Pro Ala Thr Pro Ala Thr Pro Ala Ala Pro Gly Ala Ala Val Pro Ala  
10 15 20 25

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	GGG AAG GCG GCG ACC GAG GAG CAG AAG CTG ATC GAG AAG ATC AAC GCC	247
	Gly Lys Ala Ala Thr Glu Glu Gln Lys Leu Ile Glu Lys Ile Asn Ala	
	30 35 40	
5	GGC TTC AAG GCC GCC GTG GCG GCC GCC GCG GGC GTC CCG CCA GGC GAC	295
	Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Gly Val Pro Pro Gly Asp	
	45 50 55	
10	AAG TAC AAG ACG TTC GTC GAA ACC TTC GGC AAG GCC TCC AAC AAG GCC	343
	Lys Tyr Lys Thr Phe Val Glu Thr Phe Gly Lys Ala Ser Asn Lys Ala	
	60 65 70	
15	TTC CTG GGG GAC CTC CCG ACC AAC TAC GCC GAT GTC AAC TCC AGG GCC	391
	Phe Leu Gly Asp Leu Pro Thr Asn Tyr Ala Asp Val Asn Ser Arg Ala	
	75 80 85	
20	CAG CTC ACC TCG AAG CTC GAC GCC GCC TAC AAG CTC GCC TAC GAC GCC	439
	Gln Leu Thr Ser Lys Leu Asp Ala Ala Tyr Lys Leu Ala Tyr Asp Ala	
	90 95 100 105	
	GCC CAG GGC GCC ACC CCC GAG GCC AAG TAC GAC GCC TAC GTC GCC ACC	487
	Ala Gln Gly Ala Thr Pro Glu Ala Lys Tyr Asp Ala Tyr Val Ala Thr	
	110 115 120	
25	CTC AGC GAG GCG CTC CGC ATC ATC GCC GGC ACC CTC GAG GTC CAC GCC	535
	Leu Ser Glu Ala Leu Arg Ile Ile Ala Gly Thr Leu Glu Val His Ala	
	125 130 135	
30	GTC AAG CCC GCT GCC GAG GAG GTC AAG CCT ATC CCC GCC GGA GAG CTG	583
	Val Lys Pro Ala Ala Glu Glu Val Lys Pro Ile Pro Ala Gly Glu Leu	
	140 145 150	
35	CAG ATC GTC GAC AAG ATT GAC GTC GCC TTC AGA ACT GCC GCC ACC GCC	631
	Gln Ile Val Asp Lys Ile Asp Val Ala Phe Arg Thr Ala Ala Thr Ala	
	155 160 165	
40	GCC AAC GCC GCC CCC ACC AAC GAC AAG TTC ACC GTA TTC GAG ACC ACC	679
	Ala Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Thr Thr	
	170 175 180 185	
	TTT AAC AAG GCC ATC AAG GAG AGC ACG GGC GGC ACC TAC GAG AGC TAC	727
	Phe Asn Lys Ala Ile Lys Glu Ser Thr Gly Gly Thr Tyr Glu Ser Tyr	
	190 195 200	
45	AAG TTC ATT CCC ACC CTT GAG GCC GCC GTT AAG CAG GCC TAC GCC GCC	775
	Lys Phe Ile Pro Thr Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala	
	205 210 215	
50	ACC GTC GCA TCC GCG CCG GAG GTC AAG TAC GCC GTC TTT GAG ACC GCG	823
	Thr Val Ala Ser Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Thr Ala	
	220 225 230	

CTG AAA AAG GCG GTC ACC GCC ATG TCC GAG GCC CAG AAG GAA GCC AAG 871  
 Leu Lys Lys Ala Val Thr Ala Met Ser Glu Ala Gln Lys Glu Ala Lys  
 235 240 245

5 CCC GCC ACC GCC ACC CCG ACC CCC ACC GCA ACT GCC GCG GCC GCG GTG 919  
 Pro Ala Thr Ala Thr Pro Thr Pro Thr Ala Thr Ala Ala Ala Val  
 250 255 260 265

10 GCC ACC AAC GCC GCC CCC GTC GCT GCT GGT GGC TAC AAA ATC 961  
 Ala Thr Asn Ala Ala Pro Val Ala Ala Gly Gly Tyr Lys Ile  
 270 275

15 TGATCAACTC GCTAGCAATA TACACATCCA TCATGCACAT ATAGAGCTGT GTATGTATGT 1021

GCATGCATGC CGTGGCGCCG CGCAAGTTTG CTCATAATTA ATTCTTGGTT TTCGTTGCTT 1081

GCATCCACGA GCGACCGAGC CCGTGGATAG TCGCATGTGT ATGTAATTTT TTCTGAGAAA 1141

20 TGTGTATATG TAATATATAA TTGAGTACTA AAAAAAAAAA 1181

(2) INFORMATION FOR SEQ ID NO 58:

25 (i) SEQUENCE CHARACTERISTICS:  
 (A) LENGTH: 279 amino acids  
 (B) TYPE: amino acid  
 (D) TOPOLOGY: linear

30 (ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

Ala Asp Ala Gly Tyr Ala Pro Ala Thr Pro Ala Thr Pro Ala Thr Pro  
 35 1 5 10 15

Ala Ala Pro Gly Ala Ala Val Pro Ala Gly Lys Ala Ala Thr Glu Glu  
 20 25 30

40 Gln Lys Leu Ile Glu Lys Ile Asn Ala Gly Phe Lys Ala Ala Val Ala  
 35 40 45

Ala Ala Ala Gly Val Pro Pro Gly Asp Lys Tyr Lys Thr Phe Val Glu  
 50 55 60

45 Thr Phe Gly Lys Ala Ser Asn Lys Ala Phe Leu Gly Asp Leu Pro Thr  
 65 70 75 80

Asn Tyr Ala Asp Val Asn Ser Arg Ala Gln Leu Thr Ser Lys Leu Asp  
 50 85 90 95

Ala Ala Tyr Lys Leu Ala Tyr Asp Ala Ala Gln Gly Ala Thr Pro Glu

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	100		105		110
	Ala Lys Tyr Asp	Ala Tyr Val	Ala Thr Leu Ser	Glu Ala Leu Arg	Ile
	115		120		125
5	Ile Ala Gly Thr	Leu Glu Val	His Ala Val	Lys Pro Ala Ala	Glu Glu
	130		135		140
	Val Lys Pro Ile	Pro Ala Gly	Glu Leu Gln	Ile Val Asp	Lys Ile Asp
10	145		150		155 160
	Val Ala Phe Arg	Thr Ala Ala	Thr Ala Ala	Asn Ala Ala	Pro Thr Asn
		165		170	175
15	Asp Lys Phe Thr	Val Phe Glu	Thr Thr Phe	Asn Lys Ala	Ile Lys Glu
		180		185	190
	Ser Thr Gly Gly	Thr Tyr Glu	Ser Tyr Lys	Phe Ile Pro	Thr Leu Glu
		195		200	205
20	Ala Ala Val Lys	Gln Ala Tyr	Ala Ala Thr	Val Ala Ser	Ala Pro Glu
		210		215	220
	Val Lys Tyr Ala	Val Phe Glu	Thr Ala Leu	Lys Lys Ala	Val Thr Ala
25	225		230		235 240
	Met Ser Glu Ala	Gln Lys Glu	Ala Lys Pro	Ala Thr Ala	Thr Pro Thr
		245		250	255
30	Pro Thr Ala Thr	Ala Ala Ala	Val Ala Thr	Asn Ala Ala	Pro Val
		260		265	270
	Ala Ala Gly Gly	Tyr Lys Ile			
		275			
35					

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